

JIMAR, PFRP ANNUAL PROGRESS REPORT FY 2001

P.I. Name: John Sibert

Project Proposal Title: Integrative modeling in support of the Pelagic Fisheries Research Program: Spatially disaggregated population dynamics models for pelagic fisheries.

Funding Agency: NOAA

1. Purpose of the project and indicative results.

The general objective of this research is to integrate the results of different components of the Pelagic Fisheries Research Program into a consistent framework that integrates knowledge of fish movement and population dynamics, the fishing process, economics and oceanography. The primary focus is the development of spatial models of pelagic fish population dynamics that explicitly include movement, mortality, and fisheries. The work emphasizes collaboration with other PFRP projects.

2. Progress during FY 2001. Provide a thorough discussion of accomplishments and problems.

The addition of Dr. Shiham Adam as a post doctoral researcher with this project has greatly increase project productivity. Technical improvement in large-scale advection-diffusion-reaction model used for analysis of tuna tagging data enabled completion of the analysis of the SPC RTTP* yellowfin and skipjack tagging data (*SPC RTTP = Secretariat of the Pacific Community, Noumea, Regional Tuna Tagging Project). Dr. Adam brought with him data on skipjack tagging and recapture in the Maldivé archipelago in the Indian Ocean. These data are more manageable than the SPC data and facilitated development and testing of model improvements. The results of the SPC analysis will be applied to population exchanges within the WPRFMC area. A manuscript describing the Maldivé analysis has been completed and submitted for publication.

The analysis of the Hawaii Tuna Tagging Project (HTTP) data using the bulk transport model has been completed. Estimates of size dependent natural and fishing mortality and exchange rates between fishing grounds are now available. Several presentations have been made to fisheries managers concerning the interaction between offshore and inshore fishing grounds.

Preliminary analysis of the HTTP data using the diffusion model have been completed. Definitive results await compilation of fishing effort data from the National Marine Fisheries Service and Hawaii State Division of Aquatic Resources agencies.

A state space Kalman filter model was developed to analyze horizontal movements of fish tracked with archival and applied to data from tags deployed in bigeye tuna with PFRP funding. The model appears to provide realistic estimates of geolocation errors, movement parameters applicable to population movement, and resolve indeterminate position estimates produced by the tags during the equinox.

3. Plans for the next fiscal year.

1. Complete analysis of HTTP data.
2. Extend state space Kalman filter model to tracks of longer duration.

4. List of papers published in refereed journals during FY 2001.

Fonteneau, A, P. Pallares, J. Sibert and Z. Suzuki, 2002. Effect of tuna fisheries on tuna resources and on offshore pelagic ecosystems. In Ocean Yearbook Vol. 16. E. M. Borgese, A. Chircop, and M. McConnell (eds).

Sibert, J., 2000. Symposium on tagging and tracking marine fish. Strategies and Technologies for ICZM. Integrated Coastal Zone Management, 1: 213-215.

Sibert, John, Kim Holland, and David Itano, 2000. Exchange Rates of Yellowfin and Bigeye Tunas and Fishery Interaction Between Cross Seamount and Near-shore FADs in Hawaii. *Aquatic Living Resources*. 13 (4): 225-232.

5. Other papers, technical reports, meeting presentations, etc.

Adam, M.S., and J. Sibert, 2001. Population dynamics and movements of skipjack tuna in the Maldivian fishery: Analysis of tagging data from advection diffusion reaction model. (Ms. in review).

Adam, S., J. Sibert, D. Itano, K. Holland. 2001. Population dynamics and fishery interaction of yellowfin and bigeye tuna from the Hawaii tuna tagging project. (Ms in review)

Adam, S., J. Sibert, D. Itano, K. Holland. 2001. "Population dynamics and fishery interaction of yellowfin and bigeye tuna from the Hawaii tuna tagging project." Fifty-second annual tuna conference, Lake Arrowhead, May 21-24, 2001.

Sibert, J, M. Musyl, R. Brill. 2001. "Horizontal movements of bigeye tuna near Hawaii from archival tagging data" Fifty-second annual tuna conference, Lake Arrowhead, May 21-24, 2001.

Sibert, J. 2001. Integrated Statistical Models of Tuna Movement in Relation to Fish Attractors. Invited presentation to "Deep Rigs as Fads" ,Technical Session and Panel, AFS Southern Division Midyear Meeting, Jacksonville,FL, Feb.22-25,2001

Sibert, J. 2000. "Estimates of geolocation errors and population movement parameters for bigeye tuna using archival tags" PFRP Principal Investigators Workshop ,December 5-7, 2000, Honolulu.

Sibert, J. 2000. Symposium on tagging and tracking marine fish. Strategies and Technologies for ICZM. Integrated Coastal Zone Management.. 1: 213-215.

6. Names of students graduating with MS or Ph.D. degrees during FY 2001. Include title of thesis or dissertation.

None